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EXAMINER
ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/675,697	BAER ET AL.
	Examiner	Art Unit
	Maureen G. Arancibia	1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 21 July 2006.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,2,4,6,8-16,18 and 21-30 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,2,4,6,8-16,18 and 21-30 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 22 June 2006 and 21 July 2006 have been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 2, 4, 6, 8-16, 18, 23-26, and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,315,875 to Sasaki in view of U.S. Patent Application Publication 2004/0027730 to Lille.

In regards to Claim 1, Sasaki teaches a method of forming a read sensor for a magnetic head, comprising, prior to forming a track width for a read sensor: forming a first protective layer 5g over a plurality of read sensor layers (Figure 13; Column 11, Line 58); forming a first photoresist layer 21 in a central region over the plurality of read sensor layers (Figures 13-14; Column 12, Lines 1-5); performing a reactive ion etching (RIE) to remove end portions of the protective layer 5g in end regions that surround the

central region, thereby leaving intact a central protective portion of the protective layer underneath the first photoresist structure; performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor (Figures 15 and 16; Column 12, Lines 11-62); forming an insulating layer 4b around the read sensor (Column 12, Line 63 - Column 13, Line 2); and removing the photoresist layer. (Column 13, Line 2) Sasaki teaches that the method further comprises, after defining the stripe height: forming a second photoresist layer 23 in a central region over the read sensor layers (Column 13, Lines 27-29), and etching the exposed portions of the read sensor layers to define a track width W for the read sensor. (Figure 19; Column 13, Lines 32-34)

In regards to Claim 1, Sasaki does not expressly teach that the RIE is performed without removing *any* of the read sensor layers.

Lille teaches that an RIE is performed to remove a protective layer 908 without removing any of the underlying read sensor layers. The read sensor layers are later removed by ion milling. (Figures 13 and 15; Paragraphs 46 and 48)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Sasaki for the RIE to be performed so as to remove the end portions of the protective layer without removing any of the underlying read sensor layers. The motivation for doing so would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor

layers are removed. Sasaki teaches that performing only ion milling would damage the underlying shield gap layer 4a, whereas removing the layers making up the GMR element by a two step etching process keeps the shield gap layer from being damaged. (Column 12, Lines 11-62) Even removing just the protective layer from the top surface of the GMR element would be an obvious variant of the teachings of Sasaki.

In regards to Claims 1 and 6, Sasaki does not expressly teach that the first photoresist can be removed by mechanical compression with a chemical-mechanical polishing (CMP) pad until it reaches a top surface of the protective layer.

Lille teaches that a photoresist used in a method of forming a read sensor can be sheared off by CMP, stopping at a protective layer 908. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to use the CMP method taught by Lille in the practice of Sasaki. The motivation for doing so, as taught by Lille (Paragraph 53), is that CMP can successfully remove the resist even when other materials have been deposited on it, without damaging the read sensor layers.

In regards to Claim 1, Sasaki does not expressly teach that the protective layer is a CMP protective layer that provides a suitable physical barrier to protect the read sensor layers from the CMP pad.

Lille teaches that first protective layer 908 can be made of a CMP protective material. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to modify the protective layer taught by Sasaki to form it of a CMP protective material, as taught by Lille. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to

help prevent mechanical dishing into the read sensor when the resist is removed by CMP.

In regards to Claim 2, Sasaki does not expressly teach that the photoresist 21 can be formed without an undercut.

Lille teaches that a photoresist 2002 used in a method of forming a read sensor can be formed without an undercut. (Figure 20; Paragraph 45)

It would have been obvious to form the photoresist taught by Sasaki without an undercut, as taught by Lille. The motivation for doing so would have been to form the photoresist in a single step, rather than depositing it in two layers, as Lille discloses is also known in the prior art (Paragraph 45).

In regards to Claim 4, Sasaki also teaches forming hard bias layer 61 and lead layer 6 around the read sensor (Figure 19; Column 13, Lines 38-61), and removing the second photoresist 23 (Column 13, Lines 57-58).

Sasaki does not expressly teach that the second photoresist can be removed by CMP.

Lille teaches that a photoresist used in a method of forming a read sensor can be sheared off by CMP. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to use the CMP method taught by Lille to remove the second photoresist taught by Sasaki. The motivation for doing so, as taught by Lille (Paragraph 53), is that CMP can successfully remove the resist even when other materials have been deposited on it.

In regards to Claim 8, the combination of Sasaki and Lille discussed above does not expressly teach that a second CMP protective layer of insulator material is formed prior to removing the first photoresist structure.

However, Lille additionally teaches that a second CMP protective layer 2302 of insulator material should be formed over materials that surround the read sensor layers before removing a photoresist structure. (Figure 23; Paragraph 53)

It would have been obvious to one of ordinary skill in the art to further modify the combination of Sasaki and Lille to form a second CMP protective layer of insulator material before removing a photoresist structure. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to protect the surrounding materials from the CMP removal of the photoresist.

In regards to Claims 9 and 10, the combination of Sasaki and Lille as applied to Claim 8 does not expressly teach that the second protective layer has a thickness of 100-200 Angstroms, or that both the first and second protective layers can comprise carbon.

Lille teaches that first protective layer 908 and second protective layer 2302 can each be formed of diamond-like carbon (DLC) with a thickness of 40-200 Angstroms. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to make each protective layer of diamond-like carbon (DLC) with a thickness of 40-200 Angstroms, as taught by Lille. The motivation for doing so would have been to use protective layers that are suitably CMP-resistant. (Paragraph 53) The examiner notes that it has been

held that the selection of a known material based on its suitability for its intended use is *prima facie* obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

In regards to Claim 11, Sasaki does not expressly teach removing the central protective portion by RIE prior to forming the second photoresist structure.

Lille teaches that the central portion of a protective layer 908 formed over the read sensor layers can be removed by RIE. (Paragraphs 53, 54)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Sasaki to remove the first protective layer by RIE before forming the second photoresist. The motivation for doing so, as taught by Lille (Paragraph 54), would have been to expose the underlying read sensor layers to an oxygen plasma in order to increase the sensitivity of the read sensor. The motivation for performing this step prior to forming the second photoresist, rather than after it had already been formed and then removed, would have been to avoid exposing the intermediately-formed lead layers to the same plasma.

In regards to Claim 12, Sasaki teaches a method of forming a stripe height for a read sensor for a magnetic head, comprising: forming a first protective layer 5g over a plurality of read sensor layers (Figure 13; Column 11, Line 58); forming a first photoresist layer 21 in a central region over the plurality of read sensor layers (Figures 13-14; Column 12, Lines 1-5); performing a reactive ion etching (RIE) to remove end portions of the protective layer 5g in end regions that surround the central region, thereby leaving intact a central protective portion of the protective layer underneath the

first photoresist structure; performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor (Figures 15 and 16; Column 12, Lines 11-62); and removing the photoresist layer. (Column 13, Line 2) Sasaki teaches that the method further comprises, after defining the stripe height: forming a second photoresist layer 23 in a central region over the read sensor layers (Column 13, Lines 27-29), and etching the exposed portions of the read sensor layers to define a track width W for the read sensor. (Figure 19; Column 13, Lines 32-34)

In regards to Claim 12, Sasaki does not expressly teach that the RIE is performed without removing *any* of the read sensor layers.

Lille teaches that an RIE is performed to remove a protective layer 908 without removing any of the underlying read sensor layers. The read sensor layers are later removed by ion milling. (Figures 13 and 15; Paragraphs 46 and 48)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Sasaki for the RIE to be performed so as to remove the end portions of the protective layer without removing any of the underlying read sensor layers. The motivation for doing so would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor layers are removed. Sasaki teaches that performing only ion milling would damage the underlying shield gap layer 4a, whereas removing the layers making up the GMR

element by a two step etching process keeps the shield gap layer from being damaged. (Column 12, Lines 11-62) Even removing just the protective layer from the top surface of the GMR element would be an obvious variant of the teachings of Sasaki.

In regards to Claims 12 and 16, the combination of Sasaki and Lillle just discussed does not expressly teach that the first and second photoresists can be removed by mechanical compression with a chemical-mechanical polishing (CMP) pad.

Lille teaches that a photoresist used in a method of forming a read sensor can be sheared off by CMP. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to use the CMP method taught by Lille to remove the photoresists taught by Sasaki. The motivation for doing so, as taught by Lille (Paragraph 53), is that CMP can successfully remove the resist even when other materials have been deposited on it.

In regards to Claim 12, Sasaki does not expressly teach that the first protective layer is a CMP protective layer that provides a suitable physical barrier to protect the read sensor layers from the CMP pad.

Lille teaches that first protective layer 908 can be made of a CMP protective material. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to modify the protective layer taught by Sasaki to form it of a CMP protective material, as taught by Lille. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to help prevent mechanical dishing into the read sensor when the resist is removed by CMP.

In regards to Claim 12, Sasaki does not expressly teach that a second CMP protective layer is formed around the central protective portion prior to removing the first photoresist structure.

Lille teaches that a second CMP protective layer 2302 of insulator material should be formed over materials that surround the read sensor layers before removing a photoresist structure. (Figure 23; Paragraph 53)

It would have been obvious to one of ordinary skill in the art to further modify the method taught by Sasaki to form a second protective layer before removing a photoresist structure. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to protect the surrounding materials from the CMP removal of the photoresist.

In regards to Claim 13, Sasaki teaches that after the read sensors are etched using the photoresist as a mask, and prior to removing the photoresist, an insulating layer 4b is formed around the read sensor. (Column 12, Line 63 - Column 13, Line 2) The second protective layer taught by the combination of Sasaki and Lille would protect this insulating layer when the first photoresist is removed by CMP.

In regards to Claim 14, Sasaki also teaches forming hard bias layer 61 and lead layer 6 around the read sensor (Figure 19; Column 13, Lines 38-61). The second protective layer taught by the combination of Sasaki and Lille would protect these layers when the first photoresist is removed by CMP.

In regards to Claim 15, Sasaki does not expressly teach that the photoresists 21, 23 can be formed without an undercut.

Lille teaches that a photoresist 2002 used in a method of forming a read sensor can be formed without an undercut. (Figure 20; Paragraph 45)

It would have been obvious to form both of the photoresists taught by Sasaki without an undercut, as taught by Lille. The motivation for doing so would have been to form the photoresists each in a single step, rather than depositing them in two layers, as Lille discloses is also known in the prior art (Paragraph 45).

In regards to Claim 18, the combination of Sasaki and Lille as applied to Claim 12 does not expressly teach that both CMP protective layers can comprise carbon.

Lille teaches that first protective layer 908 and second protective layer 2302 can each be formed of diamond-like carbon (DLC). (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to make each protective layer of diamond-like carbon (DLC), as taught by Lille. The motivation for doing so would have been to use protective layers that are suitably CMP-resistant. (Paragraph 53) The examiner notes that it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

In regards to Claim 23, Sasaki teaches a method of forming a stripe height for a read sensor for a magnetic head, comprising: forming a first protective layer 5g over a plurality of read sensor layers (Figure 13; Column 11, Line 58); forming a first photoresist layer 21 in a central region over the plurality of read sensor layers (Figures 13-14; Column 12, Lines 1-5); performing a reactive ion etching (RIE) to remove end portions of the protective layer 5g in end regions that surround the central region,

thereby leaving intact a central protective portion of the protective layer underneath the first photoresist structure; performing an ion milling of the read sensor layers such that end portions of the read sensor layers are removed in the end regions and a central sensor portion remains underneath the first photoresist structure, to thereby define a stripe height for the read sensor (Figures 15 and 16; Column 12, Lines 11-62); forming an insulating layer 4b around the read sensor (Column 12, Line 63 - Column 13, Line 2); and removing the photoresist layer. (Column 13, Line 2)

In regards to Claim 23, Sasaki does not expressly teach that the RIE is performed without removing *any* of the read sensor layers.

Lille teaches that an RIE is performed to remove a protective layer 908 without removing any of the underlying read sensor layers. The read sensor layers are later removed by ion milling. (Figures 13 and 15; Paragraphs 46 and 48)

It would have been obvious to one of ordinary skill in the art to modify the method taught by Sasaki for the RIE to be performed so as to remove the end portions of the protective layer without removing any of the underlying read sensor layers. The motivation for doing so would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor layers are removed. Sasaki teaches that performing only ion milling would damage the underlying shield gap layer 4a, whereas removing the layers making up the GMR element by a two step etching process keeps the shield gap layer from being damaged.

(Column 12, Lines 11-62) Even removing just the protective layer from the top surface of the GMR element would be an obvious variant of the teachings of Sasaki.

In regards to Claim 23, Sasaki does not expressly teach that the photoresist 21 can be formed without an undercut.

Lille teaches that a photoresist 2002 used in a method of forming a read sensor can be formed without an undercut. (Figure 20; Paragraph 45)

It would have been obvious to form the photoresist taught by Sasaki without an undercut, as taught by Lille. The motivation for doing so would have been to form the photoresist in a single step, rather than depositing it in two layers, as Lille discloses is also known in the prior art (Paragraph 45).

In regards to Claim 23, the combination of Sasaki and Lillle just discussed does not expressly teach that the first photoresist can be removed by mechanical compression with a chemical-mechanical polishing (CMP) pad.

Lille teaches that a photoresist used in a method of forming a read sensor can be sheared off by CMP. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to use the CMP method taught by Lille to remove the photoresist taught by Sasaki. The motivation for doing so, as taught by Lille (Paragraph 53), is that CMP can successfully remove the resist even when other materials have been deposited on it.

In regards to Claim 23, Sasaki does not expressly teach that the first protective layer is a CMP protective layer that provides a suitable physical barrier to protect the read sensor layers from the CMP pad.

Lille teaches that first protective layer 908 can be made of a CMP protective material. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to modify the protective layer taught by Sasaki to form it of a CMP protective material, as taught by Lille. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to help prevent mechanical dishing into the read sensor when the resist is removed by CMP.

In regards to Claim 23, Sasaki does not expressly teach that a second CMP protective layer is formed around the central protective portion prior to removing the first photoresist structure.

Lille teaches that a second CMP protective layer 2302 of insulator material should be formed over materials that surround the read sensor layers before removing a photoresist structure. (Figure 23; Paragraph 53)

It would have been obvious to one of ordinary skill in the art to further modify the method taught by Sasaki to form a second protective layer before removing a photoresist structure. The motivation for doing so, as taught by Lille (Paragraph 53), would have been to protect the surrounding materials from the CMP removal of the photoresist.

The central protective portion and the second protective layer taught by the combination of Sasaki and Lille would protect the read sensor and the insulator layer from mechanical interaction with the CMP pad. (Lille, Paragraph 54)

In regards to Claim 24, Sasaki teaches that the method further comprises, after defining the stripe height: forming a second photoresist layer 23 in a central region over the read sensor layers (Column 13, Lines 27-29), and etching the exposed portions of the read sensor layers to define a track width W for the read sensor. (Figure 19; Column 13, Lines 32-34)

In regards to Claim 24, Sasaki does not expressly teach that the photoresist 23 can be formed without an undercut.

Lille teaches that a photoresist 2002 used in a method of forming a read sensor can be formed without an undercut. (Figure 20; Paragraph 45)

It would have been obvious to form the photoresist taught by Sasaki without an undercut, as taught by Lille. The motivation for doing so would have been to form the photoresist in a single step, rather than depositing it in two layers, as Lille discloses is also known in the prior art (Paragraph 45).

In regards to Claim 25, see the discussion of Claim 24.

The combination of Sasaki and Lillle as applied to Claim 24 does not expressly teach that the second photoresist can be removed by mechanical compression with a chemical-mechanical polishing (CMP) pad.

Lille teaches that a photoresist used in a method of forming a read sensor can be sheared off by CMP. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to use the CMP method taught by Lille to remove the photoresist taught by Sasaki. The motivation for

doing so, as taught by Lille (Paragraph 53), is that CMP can successfully remove the resist even when other materials have been deposited on it.

In regards to Claims 26 and 28, the combination of Sasaki and Lille as applied to Claim 23 does not expressly teach that the protective layers each have a thickness of 100-200 Angstroms, or that both protective layers can comprise carbon.

Lille teaches that first protective layer 908 and second protective layer 2302 can each be formed of diamond-like carbon (DLC) with a thickness of 40-200 Angstroms. (Paragraph 53)

It would have been obvious to one of ordinary skill in the art to make each protective layer of diamond-like carbon (DLC) with a thickness of 40-200 Angstroms, as taught by Lille. The motivation for doing so would have been to use protective layers that are suitably CMP-resistant. (Paragraph 53) The examiner notes that it has been held that the selection of a known material based on its suitability for its intended use is *prima facie* obviousness. *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

In regards to Claim 29, the combination of Sasaki and Lille as applied to Claim 23 teaches that the first protective layer is formed over the read sensor layers and that the second protective layer is formed over the read sensor layers and the surrounding materials, which, as taught by Sasaki, are insulator materials 4b.

In regards to Claim 30, the combination of Sasaki and Lille just discussed does not expressly teach that the central portions of the first and second protective layers can be removed by RIE.

Lille teaches that the protective layers can be removed by RIE. (Paragraph 54, "any CMP-resistant layer")

It would have been obvious to one of ordinary skill in the art to further modify the method taught by Sasaki to remove the central portions of the first and second protective layers by RIE. The motivation for removing the first protective layer, as taught by Lille (Paragraph 54), would have been to expose the underlying read sensor layers to an oxygen plasma in order to increase the sensitivity of the read sensor. The motivation for removing the second protective layer would have been to expose the surrounding materials to further processing.

4. Claims 21 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki in view of Lille as applied to Claims 18 and 26, and further in view of U.S. Patent Application Publication 2002/0030443 to Konuma et al.

The combination of Sasaki and Lille as discussed above in regards to Claims 18 and 26 teaches two CMP protective layers, both comprising diamond-like carbon.

The combination of Sasaki and Lille does not expressly teach that the hardness of the DLC protective layer can be 22 GPa.

Konuma et al. teaches that a DLC thin film can have a hardness of 15-25 GPa. (Paragraph 82)

It would have been obvious to one of ordinary skill in the art to make the DLC films taught by the combination of Sasaki and Lille with a hardness of 22 GPa, which is in the range taught by Konuma et al. The motivation for doing so, as taught by Konuma

et al. (Paragraph 82), would have been to have protective layers that are not only hard, but do not transmit oxygen or moisture.

5. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki in view of Lille as applied to Claim 12 above, and further in view of Applicant's Admitted Prior Art (AAPA).

The teachings of Sasaki and Lille were discussed above in regards to Claim 12.

The combination of Sasaki and Lille as applied to Claim 12 does not expressly teach that both the first and second photoresists can be formed without an undercut.

Lille teaches that a photoresist 2002 used in a method of forming a read sensor can be formed without an undercut. (Figure 20; Paragraph 45)

It would have been obvious to form both of the photoresists taught by Sasaki without an undercut, as taught by Lille. The motivation for doing so would have been to form the photoresists each in a single step, rather than depositing them in two layers, as Lille discloses is also known in the prior art (Paragraph 45).

The combination of Sasaki and Lille just discussed does not expressly teach that the second photoresist structure is exposed to a solvent prior to removal.

AAPA teaches that a photoresist structure is preferably exposed to a solvent prior to removal. (Specification, Page 2, Lines 8-11)

It would have been obvious to one of ordinary skill in the art to further modify the combination of Sasaki and Lille to expose the photoresist structure to a solvent prior to removal. The motivation for doing so, as taught by AAPA (Specification, Page 2, Lines 8-11), would have been to help release the photoresist from the substrate.

Response to Arguments

6. Applicant's arguments filed 21 July 2006 have been fully considered but, to the extent to which they still apply, they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Applicant asserts that the combination of Sasaki and Lille must fail, because the combination defeats and runs counter to the main objective of the primary reference, Sasaki. The Examiner must disagree. Sasaki does, as Applicant observes, teach a conventional method of removing read sensor layers 105a, 105b, 105c making up a GMR element in a single ion milling step. (Column 3, Lines 57-61) Sasaki seeks to *improve* upon this conventional method by forming a GMR element of a plurality of read sensor layers 5a, 5e, 5b, 5f, 5c *and a protection layer 5g* that Sasaki *calls part of the GMR element 5* (Figure 13; Column 11, Lines 50-62), and following the masking steps, *etching the GMR element in a two step process*, comprising a first step of RIE and a second step of ion milling. (Column 12, Lines 11-40) Sasaki teaches that in the first etching step of RIE, *some of the layers making up the GMR element 5* are etched. (Column 12, Lines 14-17) Again, the Examiner notes that Sasaki identifies the

protection layer 5g, corresponding to the protective layer recited in the claims of the instant application, *as part of the GMR element. Therefore, when Sasaki says that some of the layers making up the GMR element 5 are etched, this includes the case that only the protection layer is etched.* However, the Examiner recognizes that Sasaki does not *expressly* disclose this embodiment of the first etching step of RIE. For this reason, the Examiner cited the teachings of Lille that an RIE is performed to remove a protective layer 908 without removing any of the underlying read sensor layers, with the read sensor layers being later removed by ion milling. (Figures 13 and 15; Paragraphs 46 and 48)

The Examiner maintains that it would have been obvious to one of ordinary skill in the art to modify the method expressly disclosed by Sasaki (that some of the layers making up GMR element 5 are etched by RIE) to incorporate the teachings of Lille (that the RIE only removes the protection layer, which Sasaki calls part of GMR element 5). *The motivation for doing so would have been to better accomplish the goal disclosed by Sasaki of exploiting the differences between the RIE and the ion milling to ensure that the layers underneath the read sensor layers are not damaged when the read sensor layers are removed.* Sasaki teaches that performing only ion milling would damage the underlying shield gap layer 4a, whereas removing the layers making up the GMR element by a two step etching process keeps the shield gap layer from being damaged. (Column 12, Lines 11-62) Even removing just the protective layer from the top surface of the GMR element would be an obvious variant of the teachings of Sasaki. (The Examiner notes that the explanation of the motivation for combining the teachings of

Sasaki and Lille has also been expanded in the rejection above, in order to better explicate the Examiner's position; however, no new grounds of rejection have been made.)

The Examiner asserts that making this modification of the teachings of Sasaki does not defeat the objective of Sasaki. This is clear for at least two reasons. First, Sasaki is seeking to improve upon a one-step etching method by performing instead a two-step etching method. Even if the first step of the etching method were only used to remove the protection layer (which Sasaki calls part of the GMR element 5), the second step of the etching method would take less time than otherwise, still allowing the goal of Sasaki to be attained. (Column 12, Lines 49-54) Second, even if, for the sake of argument, the modified method of the combination of Sasaki and Lille were deemed to be the same as performing the conventional method taught by Sasaki, the combination of Sasaki and Lille would still not be defeated. The conventional method taught by Sasaki is still a viable, workable process, which Sasaki simply seeks to improve upon. One of ordinary skill in the art would have every expectation of success in performing the conventional method. Sasaki does not teach *away* from the conventional method, but rather teaches a better way.

The Examiner further observes that even given the intention to perform a first etching step of RIE to remove only the protection layer, without removing any of the read sensor layers, some etching of the underlying read sensor layers would still occur before an endpoint detection means would be able to stop the RIE. This is especially true given that the protection layer and read sensor layers in question are extremely

thin. (See, for example, Sasaki, Column 12, Lines 1-10) This discussion raises a question of interpretation of the word "intact" as recited in the claims of the instant application. The Examiner notes that "intact" was given the broadest reasonable interpretation during the examination on the merits, namely that the read sensor layers are substantially left intact, or alternatively are not intentionally etched. Should Applicant seek to have further weight accorded to the recitation that the read sensor layers are left intact, Applicant would be requested to identify support in the original disclosure for such an interpretation, to avoid any new matter issues.

Finally, in response to Applicant's argument that there is no motivation to use the CMP method of Lille in the formation of the stripe height, the Examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation for using the CMP method of Lille to remove *either* of the photoresists taught by Sasaki (i.e. that used in defining the stripe height or that used in defining the track width), as taught by Lille (Paragraph 53), would have been that CMP can successfully remove the resist even when other materials have been deposited on it. This motivation would apply in modifying the method of defining the stripe height and the method of defining the track width taught by Sasaki, since in both cases, the methods are essentially similar -- while the methods differ in which

dimension of the read head is to be defined, in both cases the photoresist must be removed.

The Examiner further notes that upon further consideration and examination, as set forth in the rejections above, the features recited in the amendments to the claims submitted 22 June 2006 have been judged to be obvious over the combination of Sasaki and Lille.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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